MAR 2 1 1988

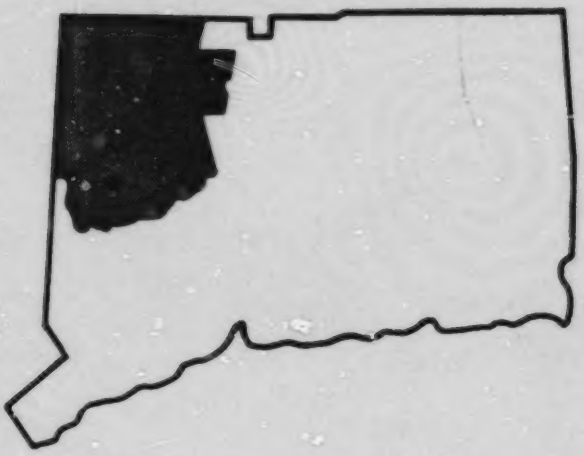
594-c-7

FEM 1.209:090057

FLOOD INSURANCE STUDY

COMPLETED

TOWN OF WASHINGTON, CONNECTICUT
LITCHFIELD COUNTY



BEST COPY AVAILABLE

JUNE 3, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 090057

IVNISIGG

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	2
	2.3 Principal Flood Problems	4
	2.4 Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
	3.1 Hydrologic Analyses	5
	3.2 Hydraulic Analyses	6
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	7
	4.1 Floodplain Boundaries	7
	4.2 Floodways	7
5.0	INSURANCE APPLICATION	9
6.0	FLOOD INSURANCE RATE MAP	10
7.0	OTHER STUDIES	10

TABLE OF CONTENTS - continued

	Page
8.0 LOCATION OF DATA	11
9.0 BIBLIOGRAPHY AND REFERENCES	11

FIGURES

Figure 1 - Vicinity Map	3
Figure 2 - Floodway Schematic	8

TABLES

Table 1 - Summary of Discharges	5
Table 2 - Summary of Stillwater Elevations	6

EXHIBITS

Exhibit 1 - Flood Profiles		15-16
Bantam River	Panels 01P-02P	15-16
East Aspetuck River	Panels 03P-05P	17-19
Shepaug River	Panels 06P-12P	20-26
Exhibit 2 - Flood Insurance Rate Map Index and Street Index		
Flood Insurance Rate Map		
Exhibit 3 - Elevation Reference Marks		

FLOOD INSURANCE STUDY
TOWN OF WASHINGTON, LITCHFIELD COUNTY, CONNECTICUT

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Washington, Litchfield County, Connecticut, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-1823, Project Order No. 20. This work was completed in December 1986.

1.3 Coordination

On February 6, 1985, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the town, and the USGS (the study contractor) to determine the streams to be studied by detailed methods. During the course of the work by the USGS, the flood elevations and flood boundaries were reviewed with community officials. An intermediate CCO meeting was held in December 1986 to review the study in progress.

On July 2, 1987, a final CCO meeting was held with representatives from FEMA, the town, and the study contractor to review the results of the study.

BLANK PAGE

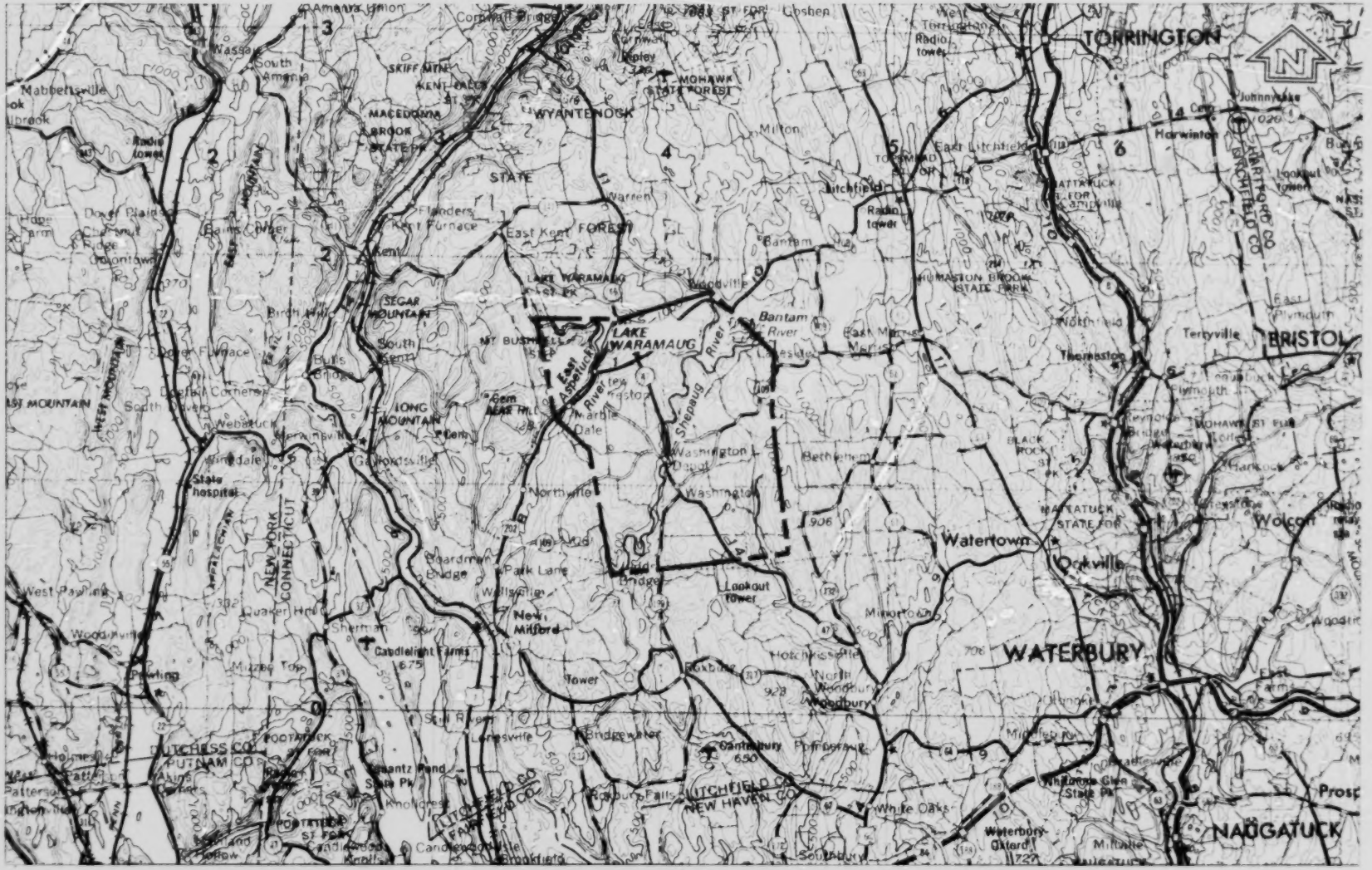


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

BEST COPY AVAILABLE

The topography of the town ranges from gently rolling terrain in the valleys to steep hilly terrain in several upland areas. The land area of Washington consists mainly of well drained, glacial, stratified drift in the valley and glacial till and bedrock in the uplands.

2.3 Principal Flood Problems

Floods in Washington have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snow cover.

Major floods of the past 50 years in Washington occurred in March 1936, September 1938, and August 1955. Of these, the flood of August 1955, which was caused by a hurricane, was by far the most severe. Stream-flow records at the USGS gaging station on the Shepaug River just downstream of Washington in Roxbury at Wellers Bridge indicate that the August 1955 peak discharge was 50,300 cubic feet per second (cfs); more than twice the 100-year peak flow.

2.4 Flood Protection Measures

There are no flood protection structures in Washington at the present time, and none are planned for the future. However, Lake Waramaug in the Towns of Washington and Warren, and Bantam Lake in the Towns of Morris and Litchfield exert a dampening effect on flood peaks on the East Aspetuck River and the Bantam River, respectively.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

The 100-year flood discharges for the Bantam and East Aspetuck Rivers were based on American Society of Civil Engineers journal article Flood Flows for Urbanized and Nonurbanized Areas of Connecticut (Reference 3). This regional method relates drainage area, channel slope, and 24-hour rainfall intensity values to the peak discharges by regression equations.

The flood-flow frequency analysis for the Shepaug River followed the standard log-Pearson Type III method as outlined by the USGS and was based on statistical analysis of stream-flow records covering a 50-year period at a USGS gaging station at Wellers Bridge Road (Station No. 01203000) in Roxbury, just downstream of Washington (Reference 4).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGE (cfs) 100-YEAR
BANTAM RIVER		
At its confluence with Shepaug River	55.1	6,220
At corporate limits	51.3	5,740
EAST ASPETUCK RIVER		
At corporate limits	18.0	1,930
At its confluence with Lake Waramaug	14.3	940
SHEPAUG RIVER		
At downstream corporate limits	117	21,400
Upstream of Bantam River	40.5	7,400

For Lake Waramaug, the 100-year flood elevation was computed by the methods described in American Society of Civil Engineers journal Flood Flows for Urbanized and Nonurbanized Areas of Connecticut (Reference 3). This flow was then adjusted for travel time due to storage in the lake and the resultant reduced flood peak was used in the appropriate equation given in USGS Water-Resources Investigation

BEST COPY AVAILABLE

BLANK PAGE

The water-surface elevations determined were used along with USGS topographic maps to determine the extent of flooding (Reference 10). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the streams studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 10).

For the flooding sources studied by approximate methods, the 100-year flood boundaries were delineated using the Flood Hazard Boundary Map for the Town of Washington (Reference 11).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself.

BEST COPY AVAILABLE

BLANK PAGE

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

BEST COPY AVAILABLE

BLANK PAGE

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

1. State of Connecticut, Register and Manual, Hartford, Connecticut, 1985.

2. State Geological and Natural History Survey of Connecticut, The Climate of Connecticut by J. J. Braumbach, Storrs, Connecticut, 1965.

3. American Society of Civil Engineers, Watershed and Management Symposium, Irrigation and Drainage Division, Flood Flows for Urbanized and Nonurbanized Areas of Connecticut by L. A. Weiss, Logan, Utah, 1975.

4. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

5. U. S. Department of the Interior, Geological Survey, Techniques of Water-Resources Investigations, Measurement of Peak Discharge at Dams by Indirect Methods, Book 3, Chapter A5, Washington, D. C., 1968.

6. U. S. Department of the Interior, Geological Survey, "Data relating depth of 100-year to drainage area at approximately 100 USGS gaging stations," on file at USGS office in Hartford, Connecticut (Unpublished).

7. U. S. Department of the Interior, Geological Survey, Techniques of Water-Resources Investigations, Measurement of Peak Discharge at Culverts by Indirect Methods, Book 3, Chapter A5, Washington, D. C., 1967.

8. U. S. Department of the Interior, Geological Survey, Techniques of Water-Resources Investigations, Measurement of Peak Discharge at Width Contractions by Indirect Methods, Book 3, Chapter A4, Washington, D. C., 1967.

9. U. S. Department of the Interior, Geological Survey, Water-Supply Paper 1420, Floods of August-October 1955, New England to North Carolina by D. B. Bogart, Washington, D. C., 1960.

BEST COPY AVAILABLE

10. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Roxbury, Connecticut, 1955, Photorevised 1970; New Preston, Connecticut, 1955, Photorevised 1971; Kent, Connecticut, 1955, Photorevised 1971.

11. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Washington, Litchfield County, Connecticut, April 8, 1977.

12. Federal Emergency Management Agency, Flood Insurance Study, Town of Roxbury, Litchfield County, Connecticut, Washington, D. C., November 12, 1986.

13. Federal Emergency Management Agency, Flood Insurance Study, Town of Litchfield, Litchfield County, Connecticut, Washington, D. C., June 15, 1982.

14. Federal Emergency Management Agency, Flood Insurance Study, Town of New Milford, Litchfield County, Connecticut (Unpublished).

15. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Kent, Litchfield County, Connecticut, Washington, D. C., March 4, 1980.

16. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Morris, Litchfield County, Connecticut, Washington, D. C., September 30, 1981.

17. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Woodbury, Litchfield County, Connecticut, Washington, D. C., October 20, 1978.

BEST COPY AVAILABLE

EXHIBIT 3 - ELEVATION REFERENCE MARKS

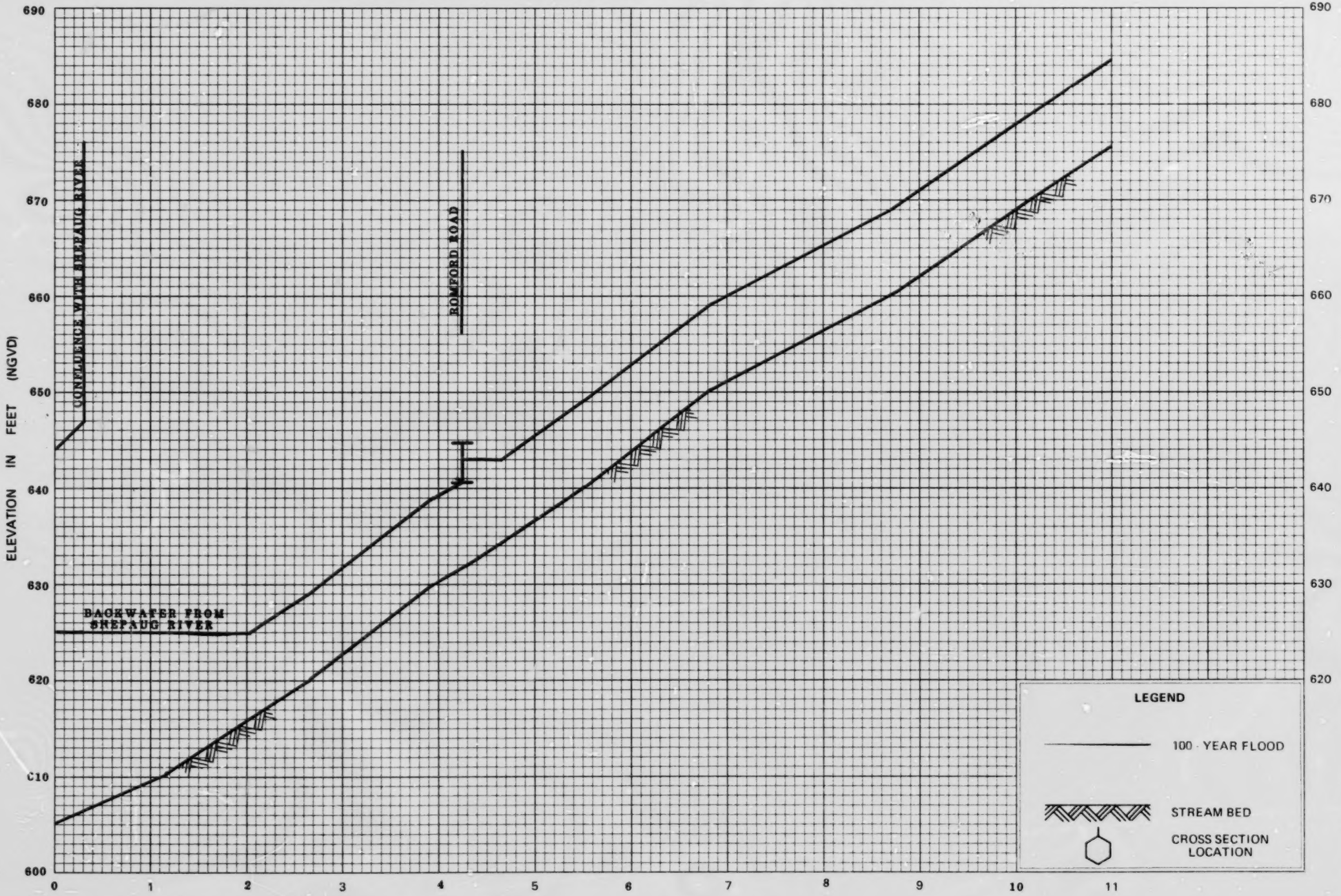
Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	05	714.38	USGCS bronze disk set in concrete monument flush with ground on west side of State Route 45 near intersection of West Shore and Flirtation Roads. Station is 6 feet northeast of SNET pole number 1710.
RM 2	05	661.84	USGCS bronze disk set in rock ledge 8 inches above road surface, 150 feet south of boy's club in New Preston.
RM 3	05	611.03	USGCS bronze tablet set in concrete monument flush with ground on southeast side of State Route 25, 27.9 feet northeast of SNET pole number 2942.
RM 4	05	514.91	USGCS bronze disk set in concrete monument flush with ground on south side of State Route 25, 4 feet north of SNET pole number 2268.
RM 5	05	717.6	Chiseled square on left end of upstream cement curbing on West Morris Road bridge over the Bantam River.
RM 6	05	640.91	Chiseled square on upstream left abutment of Romford Road bridge over the Bantam River.
RM 7	15	503.55	USGCS bronze disk set in concrete monument flush with ground, on southeast side of State Route 47, 193 feet southwest of southwest corner of State Route 47 bridge over the Shepaug River.

BEST COPY AVAILABLE

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 8	15	469.70	Chiseled square on cement masonry surrounding storm drain on east side of River Road over the Shepaug River.
RM 9	15	444.00	Chiseled square on downstream right wing wall on River Road bridge over the Shepaug River.

BEST COPY AVAILABLE



FLOOD PROFILES

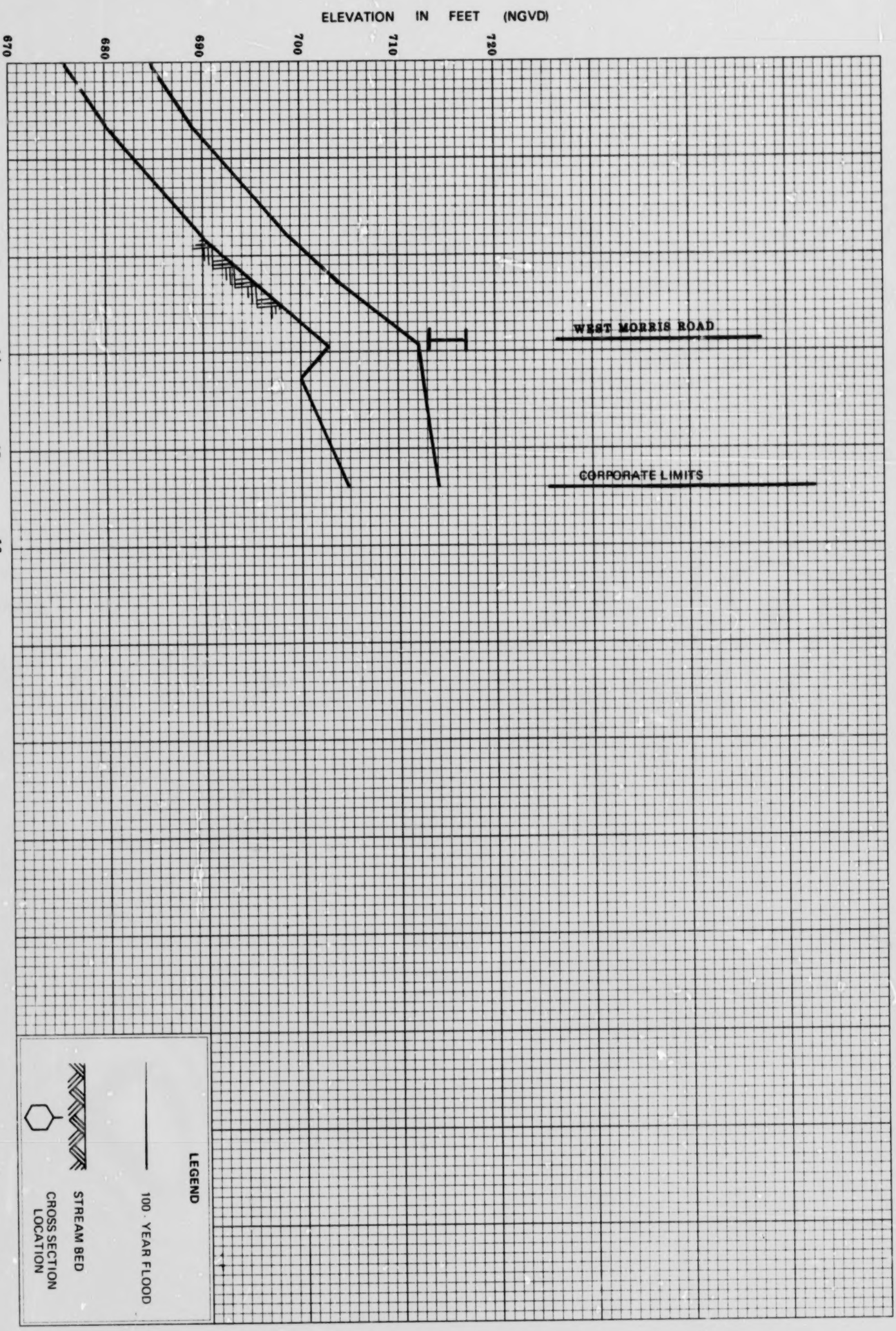
BANTAM RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

01P



BEST COPY AVAILABLE

02P

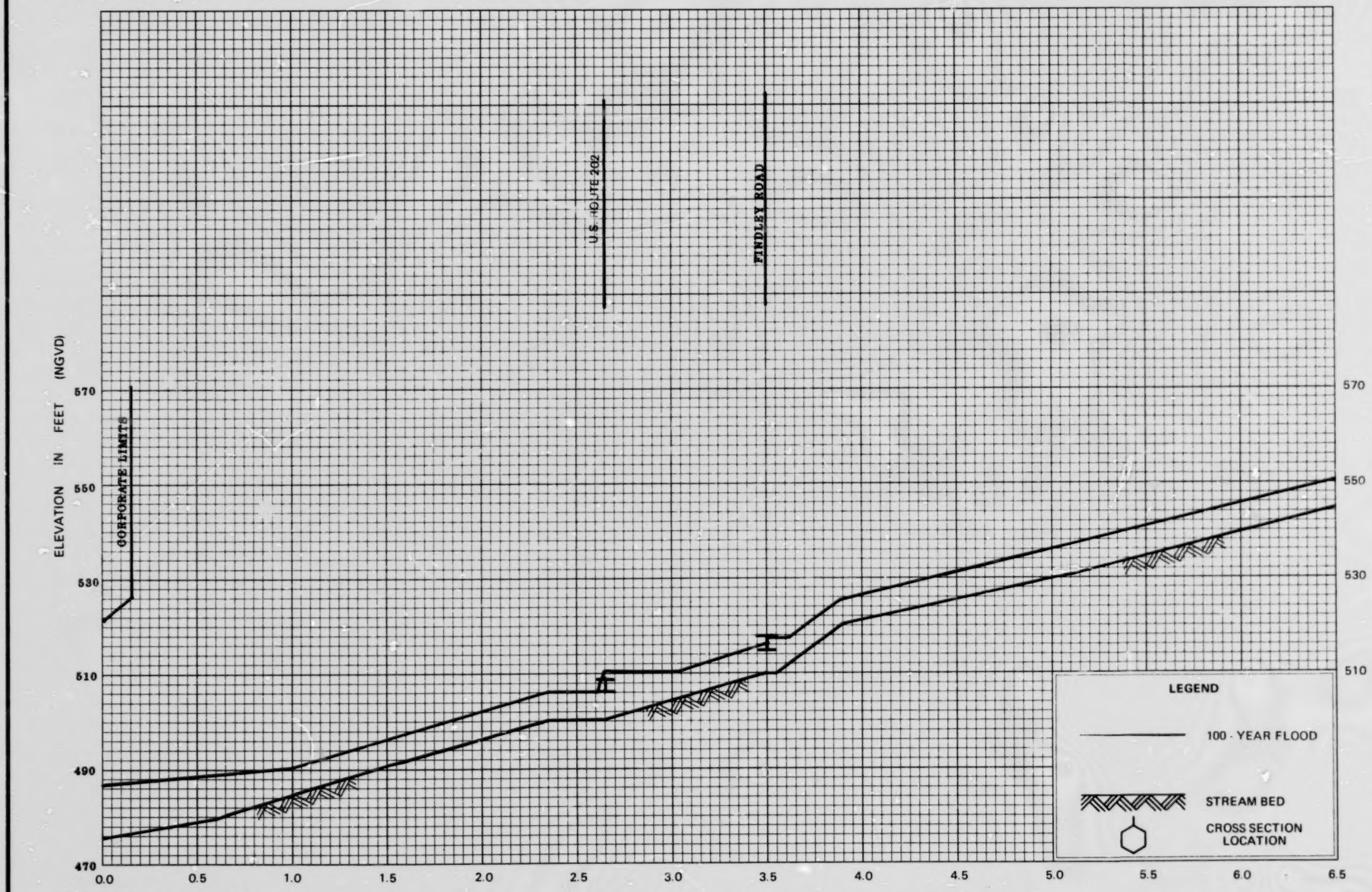
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

FLOOD PROFILES

BANTAM RIVER



BEST COPY AVAILABLE

FLOOD PROFILES

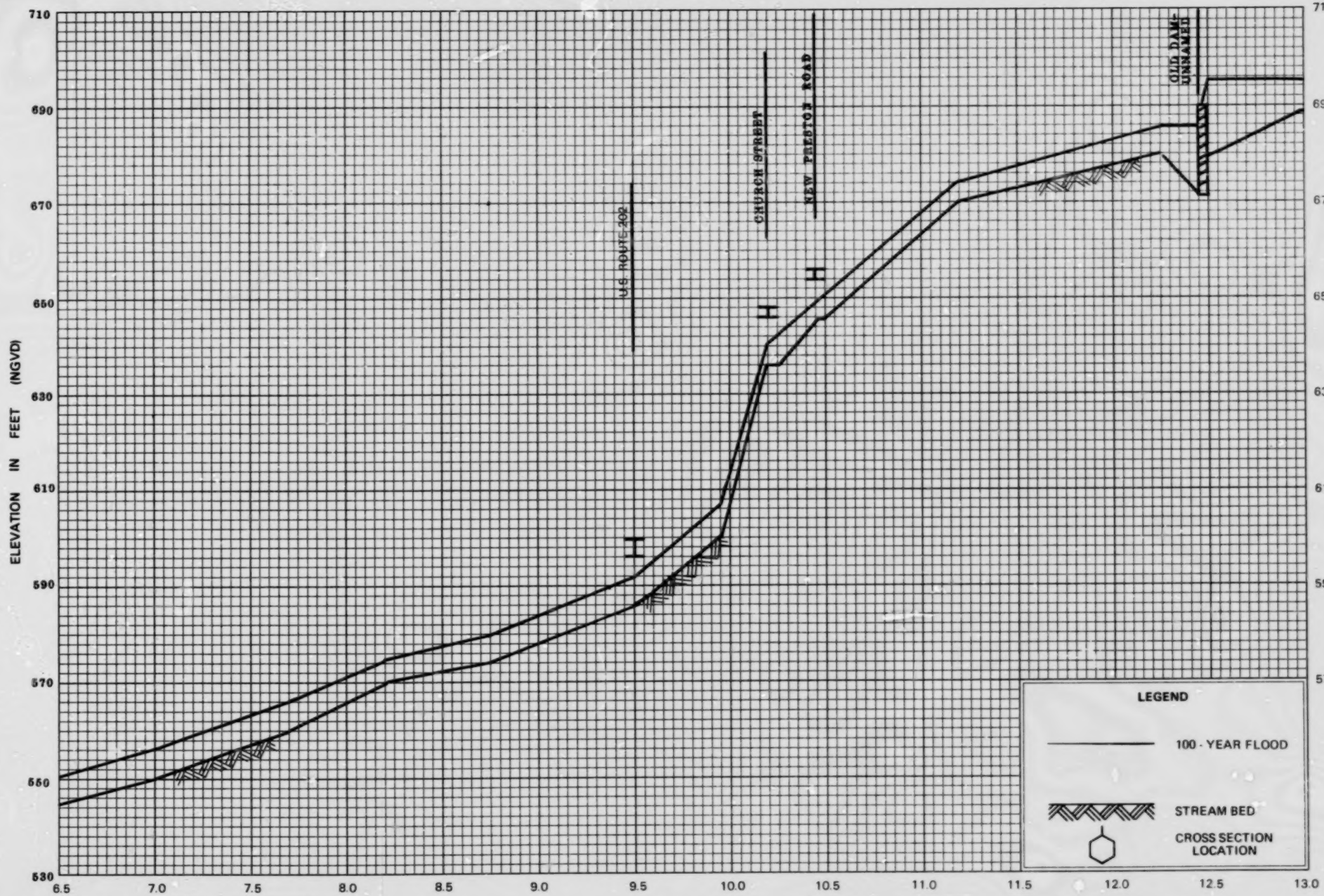
EAST ASPETUCK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

03P



FLOOD PROFILES

EAST ASPETUCK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

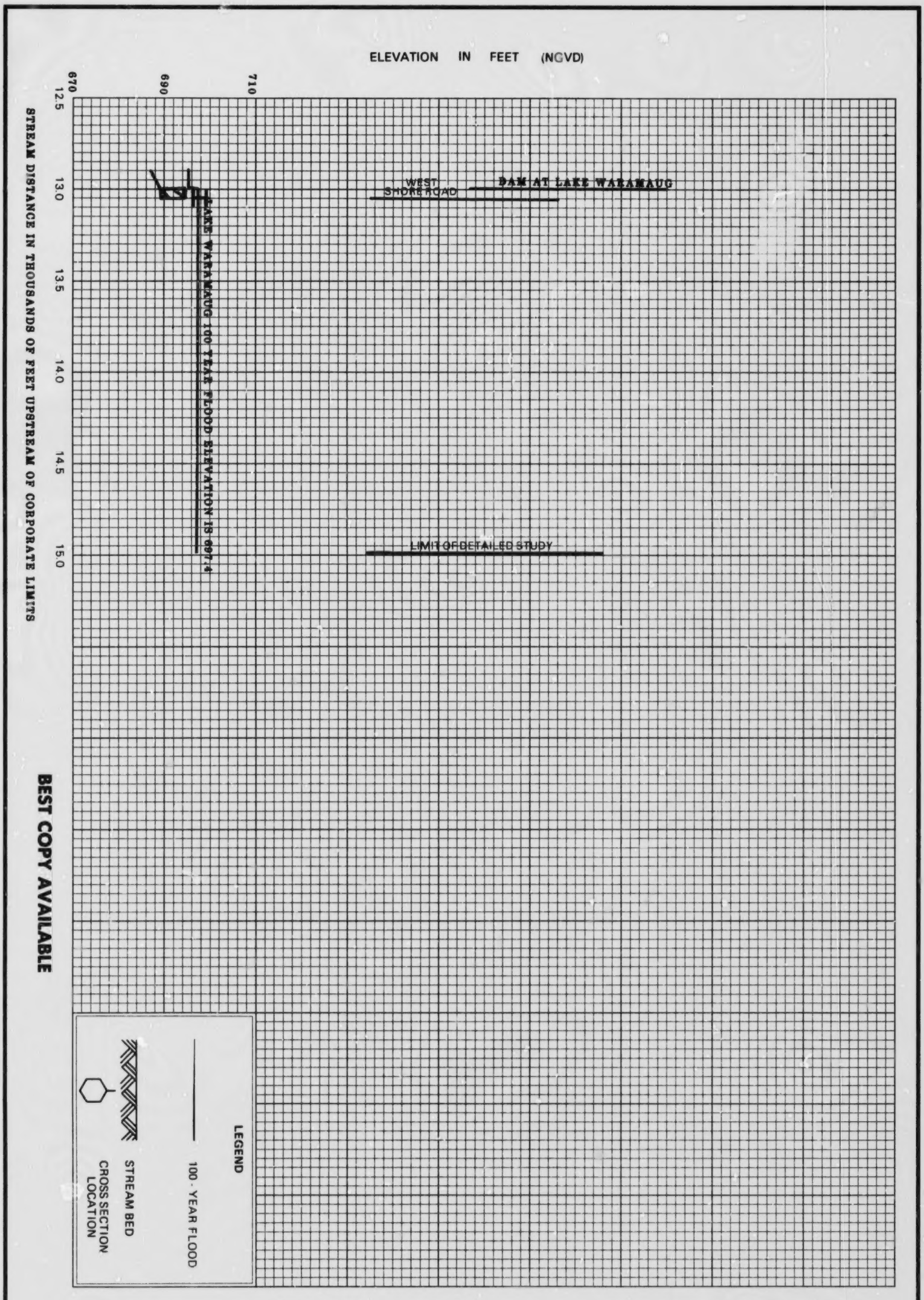
TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

04P

BEST COPY AVAILABLE

BLANK PAGE



BEST COPY AVAILABLE

05P

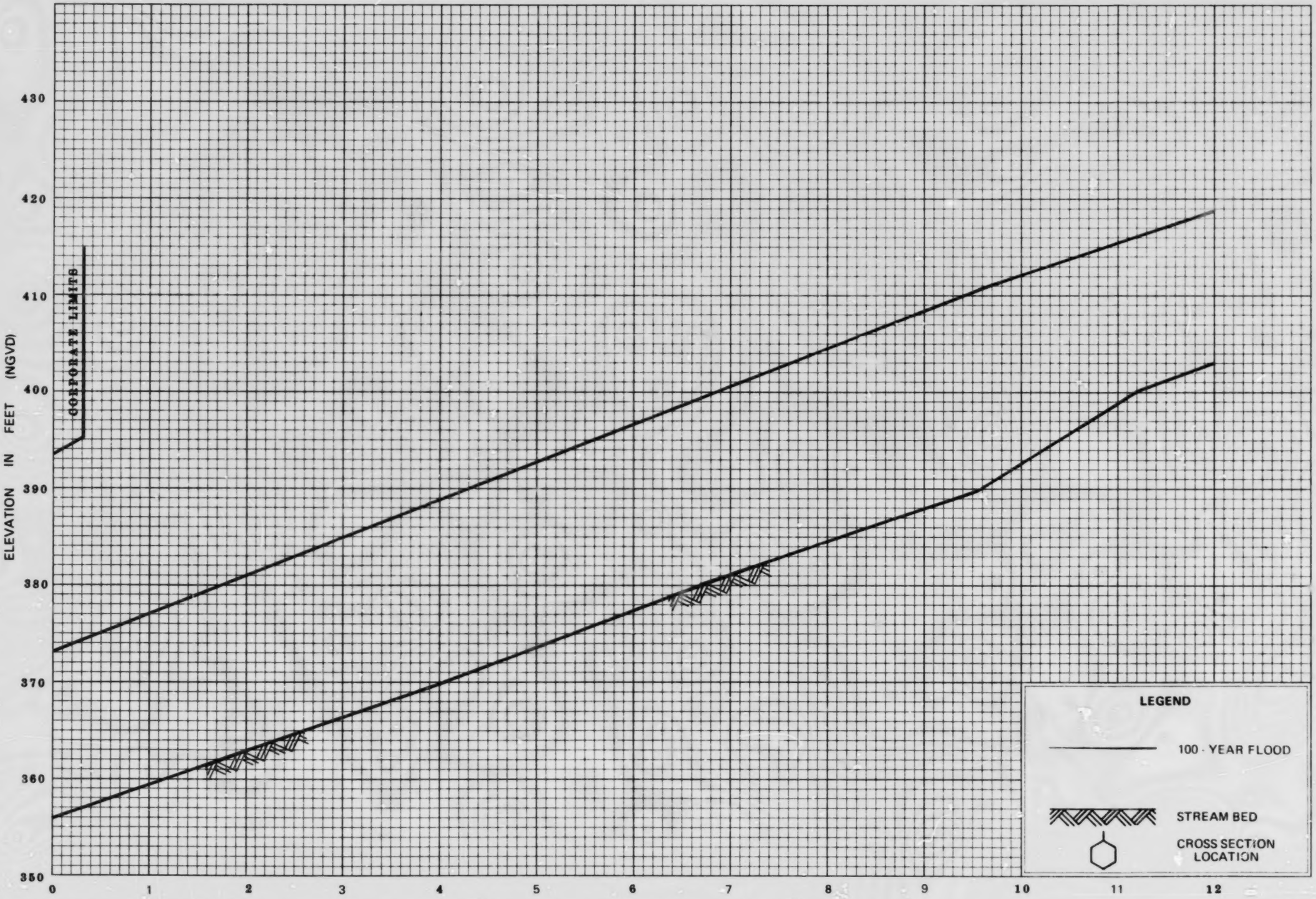
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

FLOOD PROFILES

EAST ASPETUCK RIVER



FLOOD PROFILES

SHEPAUG RIVER

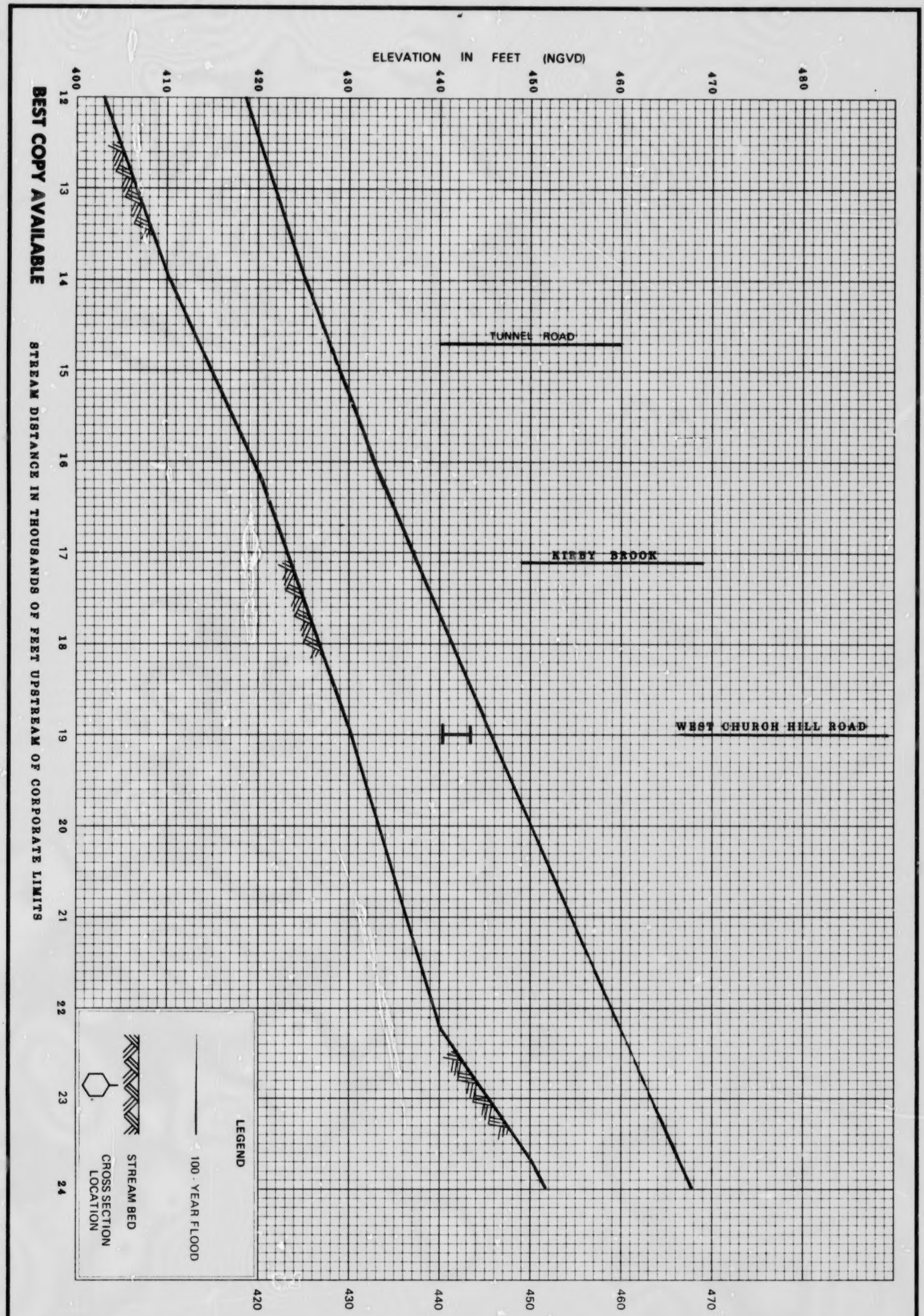
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

06P

BEST COPY AVAILABLE



BEST COPY AVAILABLE

07P

FEDERAL EMERGENCY MANAGEMENT AGENCY

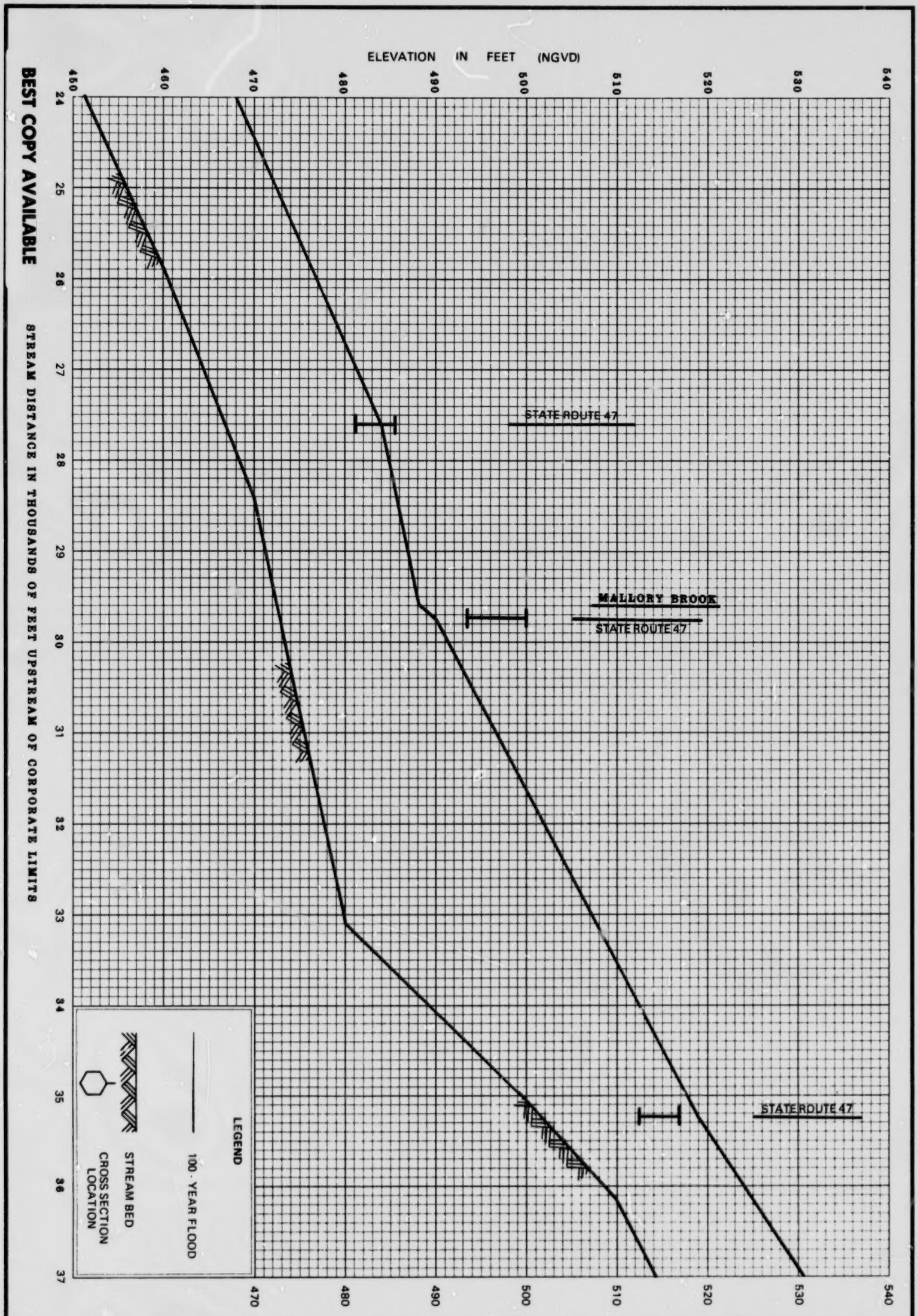
TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

FLOOD PROFILES

SHEPAUG RIVER

21



BEST COPY AVAILABLE

08P

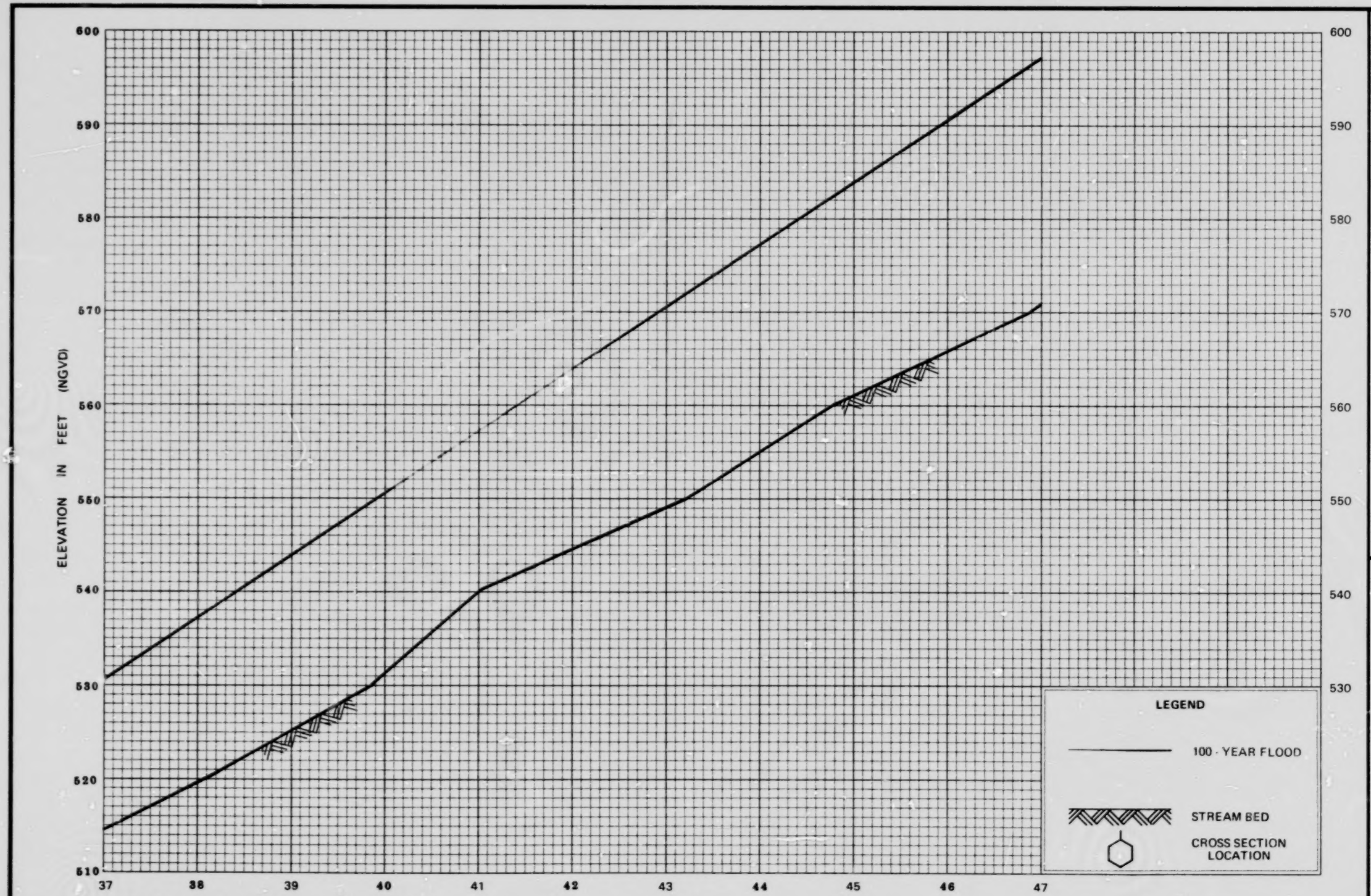
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

FLOOD PROFILES

SHEPAUG RIVER



BEST COPY AVAILABLE

FLOOD PROFILES

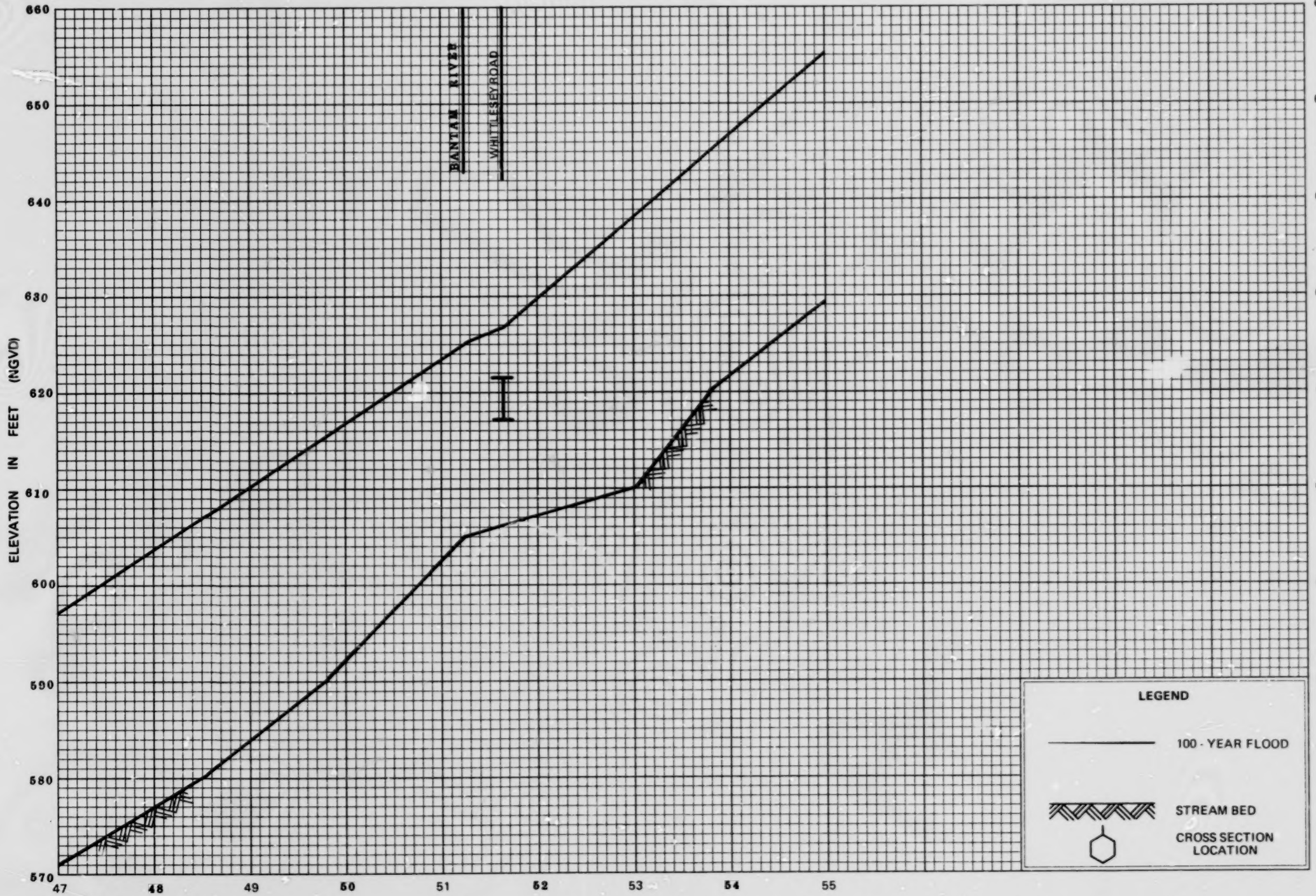
SHEPAUG RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

09P



BEST COPY AVAILABLE

FLOOD PROFILES

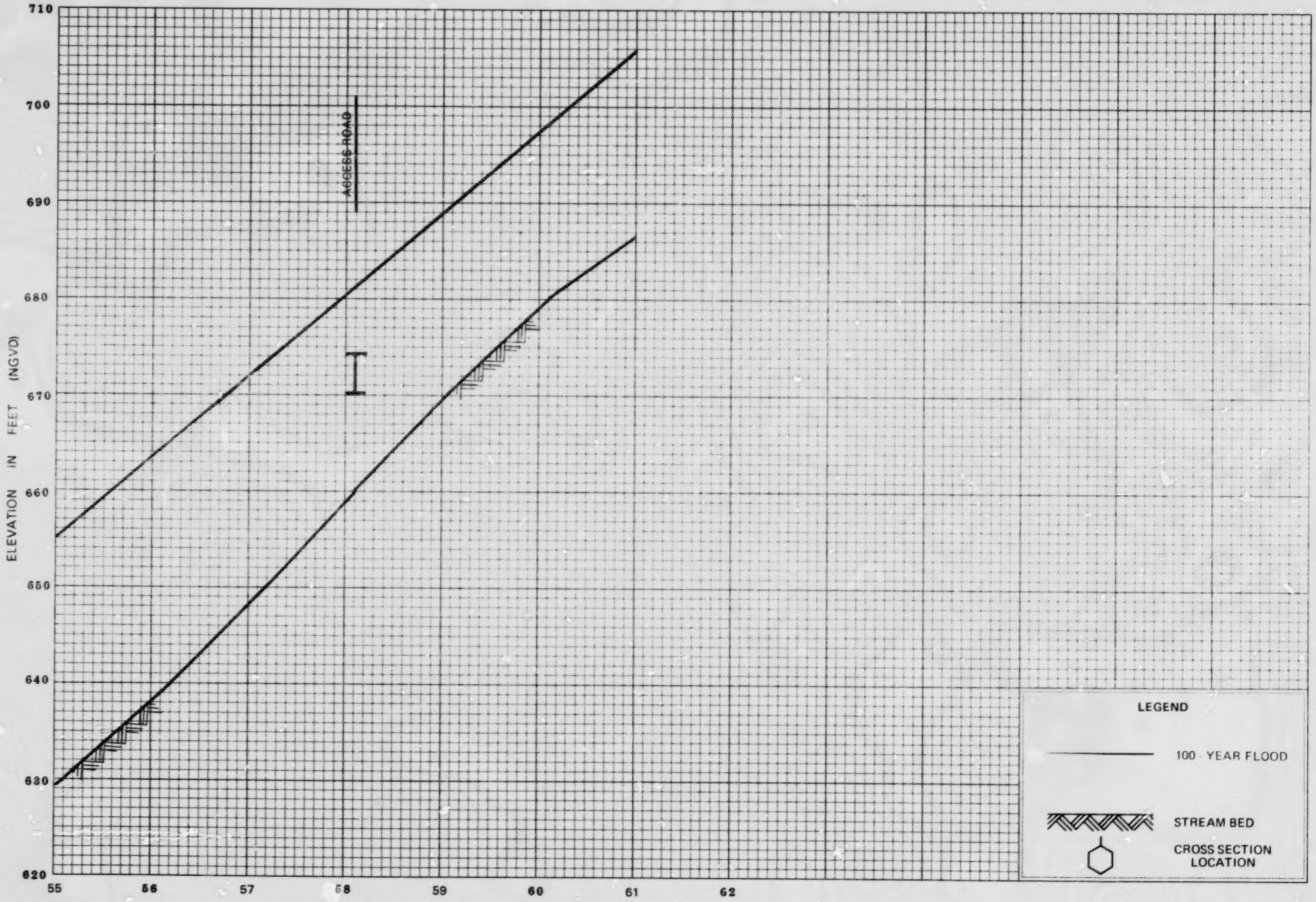
SHEPAUG RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

10P



STREAM DISTANCE IN THOUSANDS OF FEET UPSTREAM OF CORPORATE LIMITS

FLOOD PROFILES

SHEPAUG RIVER

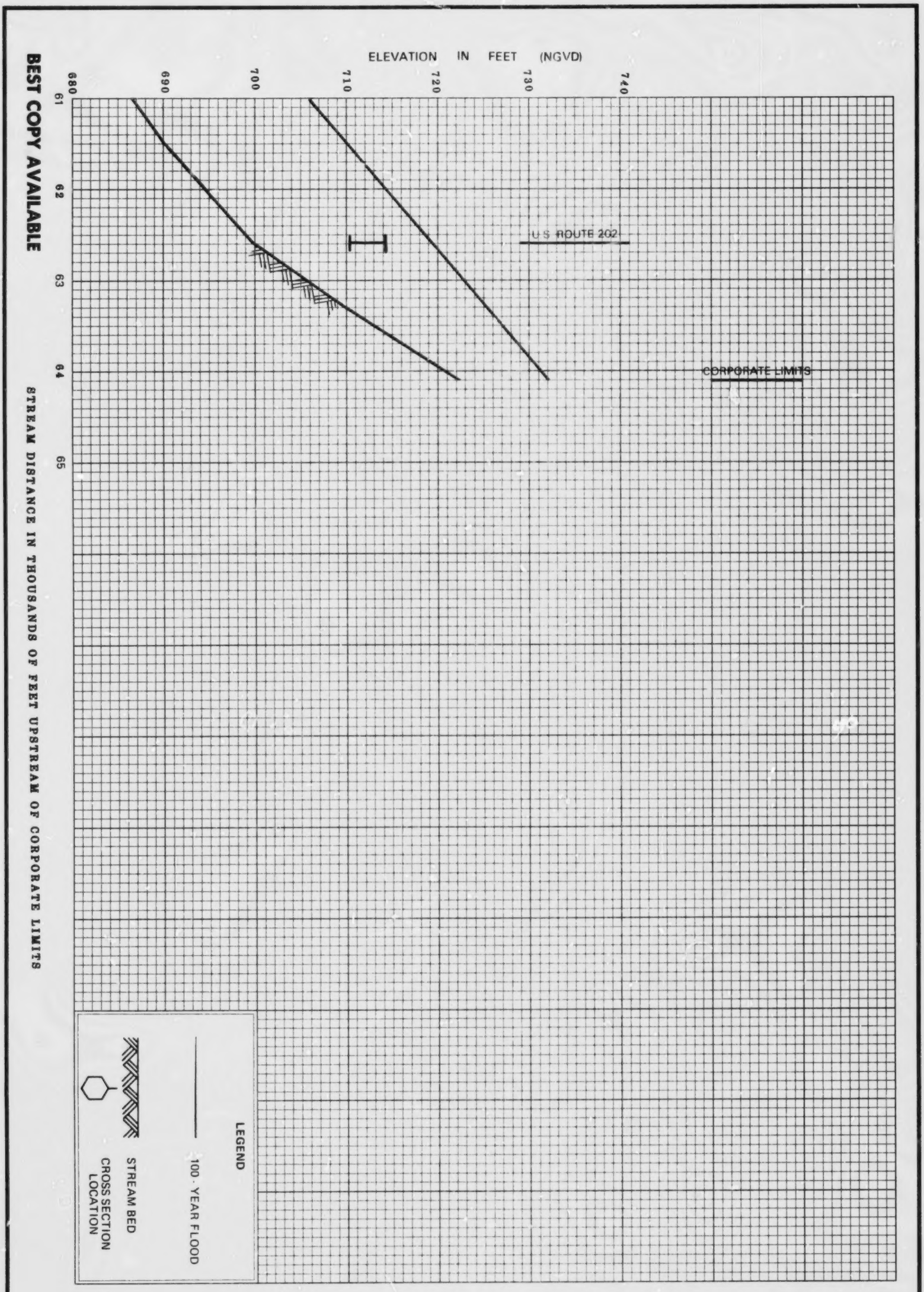
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

11P

BEST COPY AVAILABLE



BEST COPY AVAILABLE

12P

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF WASHINGTON, CT

(LITCHFIELD CO.)

FLOOD PROFILES

SHEPAUG RIVER

26